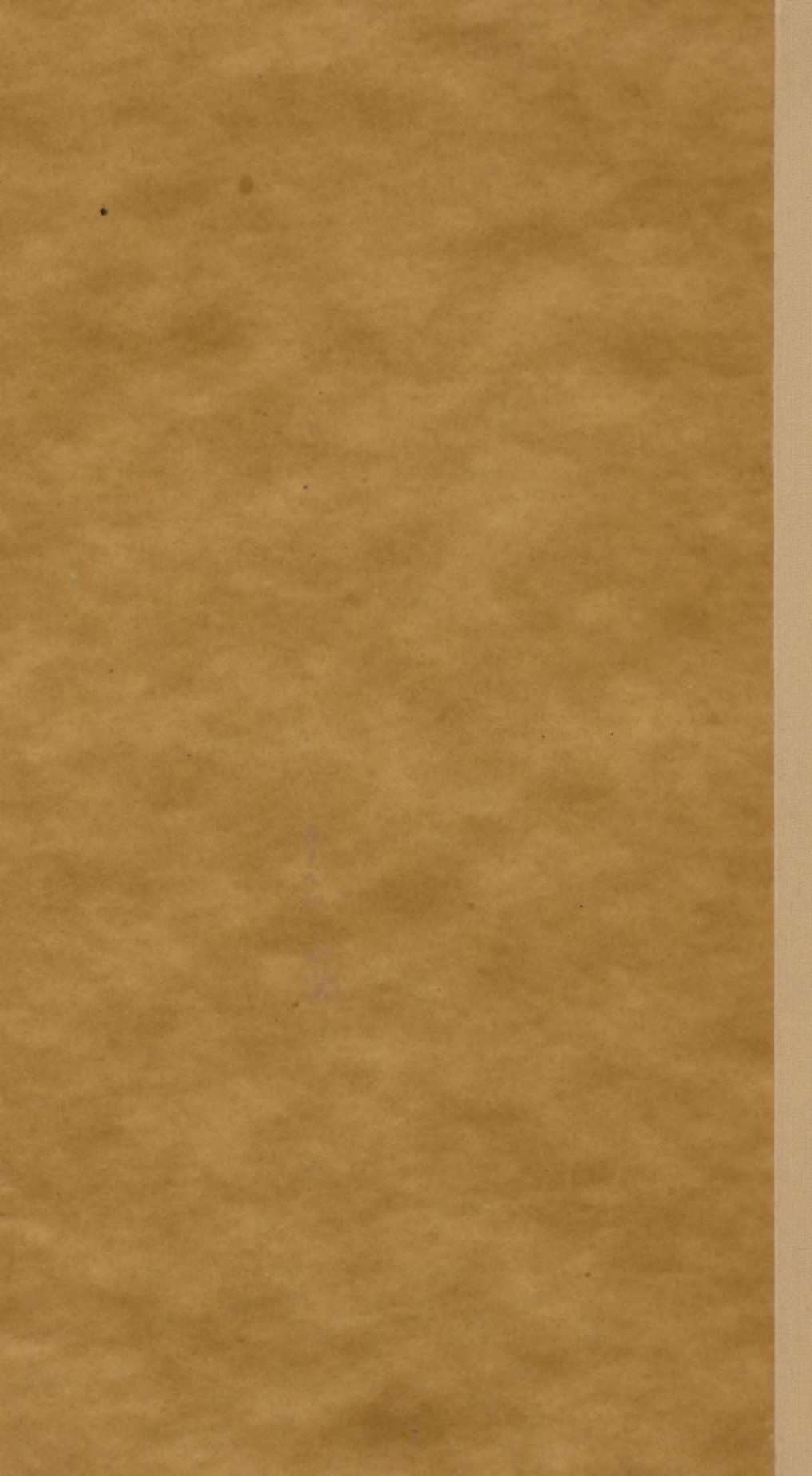
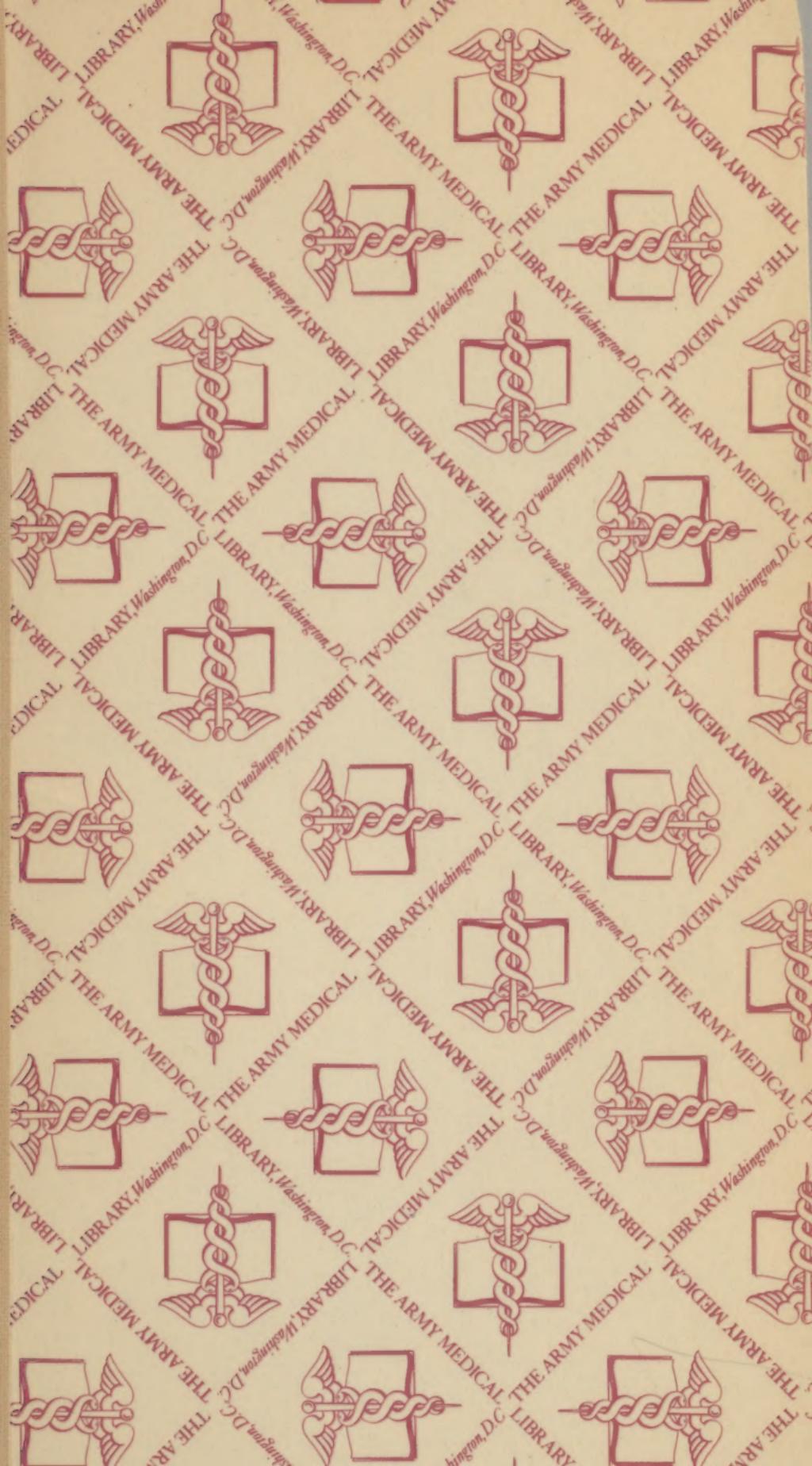


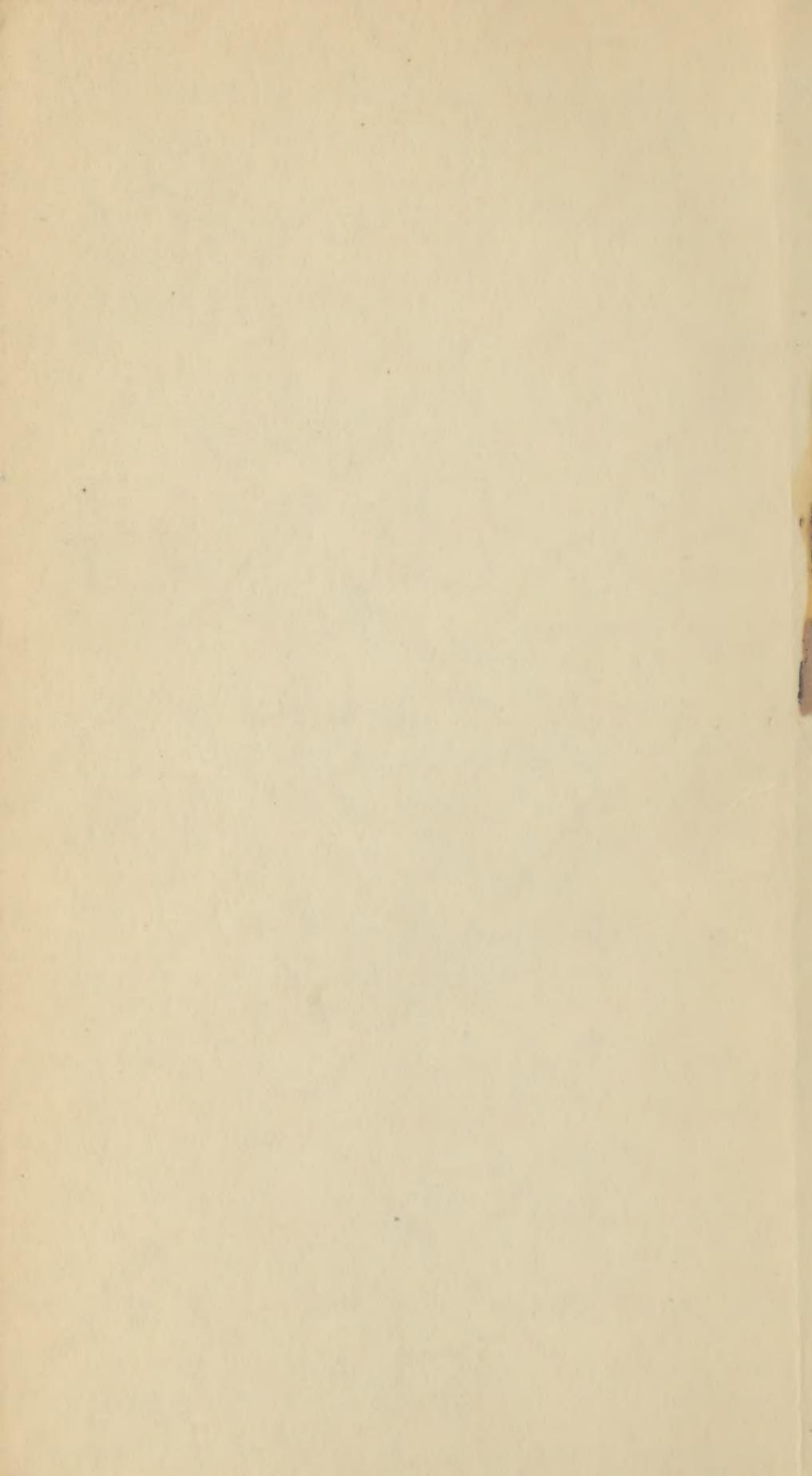
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U.S. WAR DEPT. FIELD MANUAL, CHEMICAL
WARFARE SERVICE.

EXAMINATION FOR GUNNERS.
FM 3-10.







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**CHEMICAL WARFARE
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FIELD MANUAL**



EXAMINATION FOR GUNNERS

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CHEMICAL WARFARE SERVICE FIELD MANUAL

EXAMINATION FOR GUNNERS

Prepared under direction of the
Chief of the Chemical Warfare Service



UNITED STATES
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WAR DEPARTMENT,

WASHINGTON, June 10, 1940.

FM 3-10, Chemical Warfare Service Field Manual, Examination for Gunners, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,

Chief of Staff.

OFFICIAL:

E. S. ADAMS,

Major General,

The Adjutant General.

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CHEMICAL WARFARE SERVICE FIELD MANUAL

EXAMINATION FOR GUNNERS

(The matter contained herein supersedes TR 415-5, March 1, 1937.)

SECTION I

GENERAL

- 1. PURPOSE AND SCOPE.—*a.* The purpose of this manual is to set forth in detail the examinations for determining those specially qualified in the use of the principal arms of the Chemical Warfare Service.
b. This manual covers the examination and qualification for second and first class gunners and expert gunner.
- 2. CLASSIFICATION OF GUNNERS.—Gunners will be divided into three classes; second class, first class, and expert.
a. The scope of the second class and the first class examinations will be identical and the tests therefor, as prescribed in section II, will be conducted concurrently; classification will depend upon the grade attained. The qualifying mark for classification as second class gunner will be not less than 70 credits; for first class gunner not less than 90 credits.
b. The scope of the expert test will be as prescribed in section III. The qualifying mark for expert gunner will be not less than 90 credits.
- 3. PLACE AND DATE OF EXAMINATION.—Regular annual examinations for second class, first class, and expert gunners for any unit or individual will be held once during any training year, preferably at the station of the unit or individual examined, the dates of such examinations to be determined by commanders authorized to issue qualification orders.
- 4. EXAMINING BOARDS.—Examinations for second class, first class, and expert gunners will be conducted by a board of three or more officers, at least one of whom must be in the Chemical Warfare Service. Not more than one member of the board may be selected from officers who are assigned to

the organization undergoing examination. Boards will be appointed by the commander having authority to issue qualification orders as provided in AR 35-2380.

■ 5. SUBJECTS OF EXAMINATION.—	<i>a. Gunners' test.</i>	<i>Value</i>
(1) Chemical mortar	75	
(2) Livens projector	20	
(3) Portable chemical cylinder	5	
 Total credits	100	
<i>b. Expert test.</i>		<i>Value</i>
(1) Range cards	30	
(2) Orientation	30	
(3) Meteorology	10	
(4) Computation of firing data	30	
 Total credits	100	

■ 6. GENERAL RULES GOVERNING EXAMINING BOARDS.—*a.* The conditions of the examination will be made as nearly as possible the same for all candidates.

b. The matériel with which the unit is equipped will be used in the examination.

c. Setting the scales on the sight or clinometer will be considered correct if any part of the index coincides with any part of the line of graduation of the setting ordered.

d. Settings ordered by the board in tests on the chemical mortar will always be in even divisions of the scale.

e. The candidate is permitted to traverse the piece to the middle point of traverse before each original trial at direct or indirect laying.

f. Changes in setting will not exceed the following: Deflection scale, to right 100, to left 100; elevation between 800 and 1,060 mils. At no time during a trial will any setting or change be ordered which requires a sight setting beyond the limits of the scale.

g. In time trials, time will be taken from the word at which the candidate is instructed to commence his trial, to the candidate's announcement, "Ready," or to the last word of any announcement required. No credit is allowed if the candidate performs any part of the trial after this interval.

h. Should any candidate fail in any trial through the fault of an examiner or an assistant or of a defective sight or other instrument used, that trial will be void and the candidate immediately given another trial of a similar nature.

i. The candidate may select from his organization the assistants authorized by this manual.

j. Each candidate will normally be given tests on each weapon in the order in which they are set forth herein, but any candidate may be tested in either weapon first at the discretion of the board.

k. In any case not specifically covered herein, in which the candidate's manner of performing the requirements of a test indicates that the material involved will function unsatisfactorily should it be fired, the examining board may award a suitable penalty.

l. Where changes in type of material make it desirable, boards may modify the tests prescribed herein. Credits and general principles will not be modified.

■ 7. PERSONNEL TO UNDERGO EXAMINATION.—See AR 775-10 and 35-2380.

■ 8. QUALIFICATION AND REQUALIFICATION.—See AR 775-10 and 35-2380.

■ 9. COMPENSATION AND BADGES.—*a. Compensation.*—Instructions with reference to the number of enlisted men who can be paid additional compensation are issued from time to time by the War Department.

b. Badges.—(1) Information covering gunners' badges is found in AR 600-35, 600-40, and 600-75.

(2) Immediately after each regular supplementary gunner's examination, the company or similar unit commander will report by letter to the commanding officer the names of members of his organization who have made new or renewed qualifications. A requisition for the required number of badges or bars will be submitted with the letter.

(3) Members of the National Guard who qualify will obtain badges as provided in National Guard Regulations.

(4) Badges and bars earned by members of the Organized Reserves or the Reserve Officers' Training Corps will be pro-

cured on special quartermaster requisition, adjustment of funds being made in accordance with War Department instructions.

■ 10. RECORDS AND REPORTS.—*a. Records.*—The records of an examining board will consist of the—

(1) Order convening the board.

(2) Detailed record of each candidate's examination.

(3) Reports made by the board to the convening authority.

b. Reports.—Reports will be submitted as contemplated by AR 345-1000.

SECTION II

FIRST CLASS AND SECOND CLASS GUNNERS' TEST

■ 11. SUBJECT OF EXAMINATION.—Subjects in which the candidate will be examined and the value assigned to each are as follows:

	Credits
Chemical mortar-----	75
Livens projector-----	20
Portable chemical cylinder-----	5
 Total credits-----	 100

■ 12. DETAILS OF EXAMINATION.—The examination consists of the following tests:

	Credits
<i>a. Emplacing chemical mortar-----</i>	<i>20</i>
<i>b. Laying mortar for elevation and deflection-----</i>	<i>20</i>
<i>c. Establishing line of direction with alidade or compass, mortar position fixed-----</i>	<i>5</i>
<i>d. Establishing line of direction with aiming stakes, alidade, or compass, mortar position not fixed-----</i>	<i>5</i>
<i>e. Establishing aiming line by compass azimuth-----</i>	<i>15</i>
<i>f. Preparation of ammunition assembly of one complete mortar shell with propellant-----</i>	<i>10</i>
<i>g. Laying out emplacement of 25 Livens projectors-----</i>	<i>10</i>
<i>h. Preparation of propellant charges, projectiles, wiring and testing a battery of three projectors-----</i>	<i>10</i>
<i>i. Grounding and firing portable chemical cylinder-----</i>	<i>5</i>
 Total credits-----	 100

■ 13. EMPLACING CHEMICAL MORTAR.—The chemical mortar will be emplaced as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. Surface baseplate.—(1) *Equipment required.*—(a) *For the candidate.*—One 4.2-inch chemical mortar (surface set-up), sight, pick, spade, four sandbags, and three aiming stakes.

(b) *For the board.*—A measuring tape, stop watch, rule graduated in inches, and score card.

(2) *Conditions.*—(a) The candidate will be allowed two assistants whose sole duties during the test will be to hold the sandbags while the candidate is filling them, assist the candidate in moving the baseplate, and hold the barrel while the candidate brings up the standard and assembles it to the baseplate and barrel.

(b) The line of fire will be marked prior to the test by a stake at the mortar position and one or more stakes on the required line of fire.

(c) The candidate is allowed to arrange his equipment in any way he desires on a line 1 pace in rear of the position.

(d) In checking the elevation and deflection on the installed mortar, the board uses the same sight that was used by the candidate.

(e) If any obstacles, such as large rocks, are encountered beneath the surface of the ground, making it too difficult to complete the seating of the baseplate within the prescribed time, the candidate will be given another trial.

(3) *Procedure in test.*—(a) The candidate takes position one pace in rear of the equipment.

(b) A member of the board announces the elevation and deflection to the candidate who repeats it.

(c) A member of the board then gives the command TIME, at which command the candidate installs the mortar with the given elevation and deflection as prescribed in FM 3-5 (now published as CWS FM, vol. I). If the candidate so desires, a member of the board will inform him when 5, 6, and 7 minutes, respectively, have expired.

(d) At the completion of the task, the candidate calls "Ready."

(e) The board records the time and checks the work of the candidate as follows:

1. The measuring tape is used to measure the diagonal distance between the points at which the tie rods are attached to the foot of the standard and the baseplate. It is measured from the tie rod eye on the right side of the standard to the tie rod hook on the left side of the baseplate, and from the tie rod eye on the left side of the standard to the tie rod hook on the right side of the baseplate. If these diagonals are equal, the standard is on a line perpendicular to the front edge of the baseplate.
2. The traversing screw is examined to see that it is centered.
3. The aim on the aiming stake is verified.
4. The setting on the sight is checked.
5. The range bubble is checked to see that the mortar is laid to the elevation set on the sight.
6. A member of the board will stand on the side of the baseplate to test its stability.

(4) *Scoring in test.*—(a) No credits will be given in the following cases:

1. If the difference in length of the diagonals measured as prescribed above is greater than 3 inches.
2. If the traversing screw is off center more than two turns.
3. If the line of aim on the sight is off more than 25 mils.
4. If the deflection set on the sight is off more than 25 mils.
5. If the elevation set on the sight is off more than 25 mils.
6. If the elevation on the mortar is off more than 25 mils.
7. If the weight of one man on any side of the baseplate causes the mortar assembly to move sufficiently to interfere with firing. (In the opinion of the board.)
8. If the time of installing the mortar is greater than 8 minutes.

(b) If the mortar is emplaced as prescribed in FM 3-5 (now published as CWS FM vol. I), and within the above limits, the following credits will be given:

Elevation error in mils-----	0-5	5-15	15-25
Credits-----	10	9	8
Deflection error in mils-----	0-5	5-15	15-25
Credits-----	10	9	8

Maximum credits, 20.

Time deductions as follows:

Time less than 6 minutes-----	None.
Between 6 and 7 minutes-----	2.
Between 7 and 8 minutes-----	4.
Over 8 minutes-----	No credits.

(c) The sum of the credits given above will be the credits given the candidate for the test. Possible credits, 20.

b. *Dug-in type baseplate*.—In lieu of the above test, units equipped with the steel dug-in type baseplate will be given the following test:

(1) *Equipment required*.—(a) *For the candidate*.—Baseplate, clinometer, pick, spade, six sandbags, and three aiming stakes.

(b) *For the board*.—Ruler, straightedge, at least 4 feet long, protractor, stop watch, and score card.

(2) *Conditions*.—The general conditions of the test are the same, with proper adaptations to the dug-in type baseplate, as prescribed for the surface baseplate. The clinometer will be used by the candidate instead of the sight. The baseplate pit will be dug in at 700 mils from the horizontal.

(3) *Procedure in test*.—(a) At the command TIME given by a member of the board, the candidate alines the baseplate on the target, digs the baseplate pit, and places the baseplate in the pit in the prescribed manner.

(b) At the completion of this task the candidate calls "Ready."

(c) The board records the time and then checks the work of the candidate. The deflection is checked as follows:

1. Lay diameter line of protractor along upper edge of baseplate so that the index of protractor is at the center of upper edge of baseplate and protractor is approximately horizontal.

2. Align straightedge on the target with end of straightedge in coincidence with the index of protractor.
3. Take a reading where the straightedge crosses the scale of the protractor. The difference between this reading and 1,600 mils is the error in deflection.

(4) *Scoring in test.*—(a) No credits will be given in the following cases:

1. If top of baseplate is above the ground.
2. If slope of baseplate is more than 60 mils greater or less than the angle given.
3. If top edge of baseplate makes with the line mortar-target an angle less than 1,470 mils; that is, if the error in deflection is greater than 130 mils.
4. If baseplate pit is more than 2 inches longer than the baseplate.
5. If time exceeds 20 minutes.
6. If slope of baseplate has been corrected by filling in loose earth.

(b) If the pit is found to be correct within the above limits, the following credits will be given:

1. Slope of baseplate greater or less than 700 mils by exactly or less than—

Mils	-----	20	40	60
Credits	-----	10	8	6

2. Angle of top of baseplate with line mortar-target greater or less than 1,600 mils (90°) by exactly or less than—

Mils	-----	40	70	100	130
Credits	-----	10	8	6	4

(c) The sum of the credits given above will be the credits given the candidate for the test. Possible credits, 20.

■ 14. LAYING MORTAR FOR ELEVATION AND DIRECTION.—Laying the mortar for elevation and direction will be as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. Surface baseplate.—(1) *Equipment required.*—(a) *For the candidate.*—One 4.2-inch chemical mortar (surface set-up), one aiming stake, and sight.

(b) *For the board.*—Stop watch and score card.

(2) *Conditions.*—(a) A mortar will be set up, laid on basic deflection with traversing screw centered and at any convenient elevation.

(b) The candidate is given two tests in applying changes in deflection and elevation.

(c) The firing data for each test include changes in both elevation and deflection.

(d) Both tests will include changes which can be made on the traversing screw without necessitating the movement of the standard. Changes will be not less than 50 mils deflection and 30 mils elevation.

(e) The candidate repeats each verbal order given him. The candidate is allowed to set the sight to the designated settings before time is called.

(f) Time will be taken from the last word when repeating the verbal order to the command READY, given by the candidate after the piece is re-laid.

(3) *Procedure in tests.*—(a) *First test.*—The candidate takes the post of No. 2, the gunner. A member of the board then gives the candidate a change in elevation and deflection. The change in deflection will not be greater than can be made on the traversing screw. The new elevation will be taken from the range table.

Example: Deflection, left 75; elevation, 950.

(b) *Second test.*—A second command will be given involving a change in deflection greater than 50 mils and a change in elevation greater than 30 mils.

(4) *Scoring in tests.*—(a) No credits will be given the candidate in either test—

1. If the time exceeds $1\frac{1}{2}$ minutes.

2. If the error in deflection or elevation is greater than 25 mils.

(b) *Each test.*—Error in laying elevation and deflection exactly or less than—

Mils deflection-----	5	15	25	5	5	15
Mils elevation -----	5	5	5	15	25	15
Credit time less than 45 seconds---	10	8	6	8	6	6
Credit time less than 1 minute---	8	6	4	6	4	4
Credit time less than 1½ minutes--	6	4	2	4	2	2

Total possible credits for the two tests, 20.

b. *Dug-in type baseplate.*—For units equipped with the dug-in type baseplate, the above tests will be modified as follows:

(1) Equipment for the candidate will consist of the 4.2-inch chemical mortar (dug-in type baseplate), one aiming stake, and sight.

(2) The mortar will be properly installed in the baseplate pit and sandbags will be placed in position as in firing. The aiming stake will be set up on basic deflection 50 yards in front of the mortar.

(3) Changes in deflection will be within the limits of traverse and in both tests will be in units of 10 mils.

(4) The method of scoring is the same as prescribed for the surface baseplate.

■ 15. ESTABLISHING LINE OF DIRECTION WITH ALIDADE OR COMPASS, MORTAR POSITION FIXED.—Line of direction with alidade or compass, mortar position fixed, will be established as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. *Equipment.*—(1) *For the candidate.*—One 4.2-inch chemical mortar, two aiming stakes, one hand axe, and one alidade or compass.

(2) *For the board.*—Stop watch, sight, and score card.

b. *Conditions.*—(1) The mortar will be mounted in a position selected by the board, muzzle pointing in the general direction of the target, and a stake immediately in front of the muzzle.

(2) The target will be a well-defined vertical line, visible from the mortar and between 600 and 2,000 yards from it.

(3) The candidate chooses the alidade or compass method and announces his choice to the board. A stake with a

heavy sharp metal point and some device to prevent the alidade moving too easily may be used by the candidate.

c. Procedure in test.—(1) The board conducts the candidate to a point 50 yards in front of the mortar and approximately 25 yards from the line mortar-target and points out the mortar and the target.

(2) At the command **TIME**, given by the board, the candidate establishes a stake on the line mortar-target 50 yards from the mortar, using either the alidade or compass method.

(3) At the completion of this task the candidate calls "Ready."

(4) The board then proceeds to the mortar position and by means of the sight determines the accuracy of the line established by the stakes. In checking for accuracy, the board sights along either edge (or top) of the stake as the candidate may choose, but the candidate announces this choice before he arrives at the mortar position.

d. Scoring in test.—(1) No credits will be given in the following cases:

- (a) If the time exceeds 2 minutes.
- (b) If the line established by the stake diverges from the line mortar-target by more than 30 mils.

(2) If the task is found to be correct within the limits prescribed, credits will be given as follows:

Error, in mils, exactly or less than	5	15	25	30
--------------------------------------	---	----	----	----

Credit time less than 1 minute	5	4	3	2
--------------------------------	---	---	---	---

Credit time less than 2 minutes	4	3	2	1
---------------------------------	---	---	---	---

■ 16. ESTABLISHING LINE OF DIRECTION WITH AIMING STAKES, ALIDADE, OR COMPASS, MORTAR POSITION NOT FIXED.—Line of direction with aiming stakes, alidade, or compass, mortar position not fixed, will be established as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. Equipment.—(1) *For the candidate.*—Two aiming stakes, one hand axe, and one alidade or compass.

(2) *For the assistant.*—One aiming stake and one hand axe.

(3) *For the board.*—Stop watch, drawing board, protractor, and score card.

b. Conditions.—(1) The board designates to the candidate the general location in which the mortar is to be emplaced.

(2) The target will be a well-defined point clearly visible from the approximate mortar position and between 600 and 2,000 yards from it.

(3) An assistant is allowed the candidate in this test.

(4) The candidate chooses either the stake or compass method and announces his choice to the board.

c. Procedure in test.—(1) The board conducts the candidate to a point approximately 50 yards in front of the approximate position and points out the target.

(2) At the command TIME, given by the board, the candidate drives a stake where he is standing, runs back approximately 25 yards toward the proposed mortar position and drives another stake at this point on line with the first stake and the target. He then runs back to the 50-yard stake (first stake driven), and sighting back over the 25-yard stake, directs the assistant where to drive the stake marking the exact position of the mortar.

(3) At the completion of this task the candidate calls "Ready."

(4) The board then proceeds to the stake driven by the assistant and by means of the drawing board and protractor determines the accuracy of the line established by the stakes. In checking for accuracy the board sights along either edge (or top) of the stake as the candidate may choose, but the candidate announces this choice before he arrives at the stake driven by the assistant.

d. Scoring in test.—(1) No credits will be given in the following cases:

(a) If the time exceeds 2 minutes.

(b) If the line diverges more than 30 mils.

(2) If the task is found to be correct within the limits prescribed, credits are given as follows:

Error, in mils, exactly or less than----- 5 10 20 30

Credit time less than 1 minute----- 5 4 3 2

Credit time less than 2 minutes----- 4 3 2 1

■ 17. ESTABLISHING AIMING LINE BY COMPASS AZIMUTH.—This exercise is designed to teach the soldier how to establish the aiming line under conditions of indirect firing. Instruction in the compass will be as prescribed in FM 21-25 (now published as ch. 5, BFM vol. I).

a. Equipment.—(1) *For the candidate.*—Prismatic or lensatic compass, two aiming stakes, hand axe, and an improvised wooden block or other means of steadyng compass on top of aiming stake, if desired by candidate.

(2) *For the board.*—Stop watch and score card.

b. Conditions.—(1) The board will establish an aiming stake representing the mortar position.

(2) The candidate will have one assistant in the test whose duty it will be to place the aiming stake as directed by the candidate.

(3) The candidate may employ a wooden block or other means of steadyng the compass on top of the aiming stake.

c. Procedure in test.—(1) The candidate with compass and assistant with aiming stake and hand axe will be stationed near the mortar stake.

(2) The board will choose and announce an azimuth to the candidate.

(3) The candidate will repeat the azimuth given, at which time the exercise will start.

(4) The candidate will direct the assistant to proceed quickly about 25 yards in the direction of the azimuth given, seat the compass on the aiming stake, and will direct the assistant to place the aiming stake on the line of the azimuth. When this has been accomplished, the candidate will call "Ready" and time will cease.

(5) The board will note the time consumed by the candidate.

(6) The board will check the compass azimuth reading of the line, mortar stake, aiming stake, using the same compass as the candidate.

d. Scoring in test.—(1) No credits will be given in the following cases:

(a) If the time exceeds 2 minutes.

(b) If the line diverges more than 100 mils.

(2) If the task is found to be correct within the limits prescribed, credits will be given as follows:

Error, in mils, exactly or less than	20 m or 1°	40 m or 2°	60 m or 3°	80 m or 4°	100 m or 5°
Time less than 1 minute	15	13	11	9	5
Time less than 1½ minutes	14	12	10	8	4
Time less than 2 minutes	13	11	9	7	3
Total points	15				

NOTE.—In case the prismatic compass as found in Corps of Engineers sketching cases is used in lieu of the lensatic compass, substitute 1° for approximately every 20 mils in the above table.

■ 18. PREPARATION OF AMMUNITION; ASSEMBLY OF ONE COMPLETE ROUND.—Preparation of ammunition will be as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. *Equipment.*—(1) *For the candidate.*—Two types of inert shell with different markings, sandpaper, one cartridge plain, one striker nut assembly, one upper nut for propellant charge, eight disk propellant rings, and one range table.

(2) *For the board.*—One stop watch and score card.

b. *Conditions.*—(1) The candidate will be permitted to arrange his equipment in any way he pleases.

(2) All equipment will be free of containers.

(3) Inert boosters and detonators will be used.

(4) Candidate must examine rings and demand new ones, if necessary, before time is called.

c. *Procedure in test.*—(1) The board will specify a certain kind of shell and the range to be used, then at the command TIME, given by the board, the candidate cleans or simulates cleaning the shell and assembles the complete round.

(2) Upon completion, the candidate calls "Ready."

(3) The board then examines the round to see if the shell has been properly cleaned and that all components have been properly assembled.

d. *Scoring in test.*—(1) No credit will be given in the following cases:

(a) If the wrong type of shell is selected.

(b) If the time exceeds 2 minutes.

(c) If any proper component is omitted.

(d) If the wrong number of rings is used.
 (2) If the shell is correctly prepared within the limits above, the following credits will be given:

	<i>All parts correct</i>
Credit time less than 1 minute-----	10
Credit time less than 2 minutes-----	7
Total possible points-----	10

(3) Two points will be deducted for failure to clean or simulate cleaning shell.

■ 19. LAYING OUT EMPLACEMENT FOR A BATTERY OF 25 PROJECTORS.—Laying out the emplacement for a battery of 25 projectors will be as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. *Equipment required.*—(1) *For the candidate.*—Five short stakes, two hand axes, one 50-foot metallic tape, 100 feet of tracing tape, and one shovel.

(2) *For the board.*—Plane table, protractor, three aiming stakes, 4-foot straightedge, stop watch, and score card.

b. *Conditions.*—(1) The candidate will be allowed to choose one assistant whose sole duties during the test will be to assist in measuring with the tape and driving stakes as directed.

(2) The board indicates to the candidate the line of fire which will consist of a line of three aiming stakes at least 25 feet apart.

(3) The candidate is allowed to arrange his equipment in any way he desires.

c. *Procedure in test.*—The line of fire is established with three aiming stakes. The first one, called the zero stake, marks the center of the front line of the proposed emplacement. At the command **TIME**, the zero mark of the measuring tape is attached to the zero stake by the candidate. The assistant then places a small stake on the line of fire 20 feet in front of the zero stake as directed by the candidate. This is called the 20-foot stake. The candidate then directs the assistant to hold the 40-foot mark of the measuring tape on the 20-foot stake. The candidate then picks up the tape at the 15-foot mark and moves at right angles to the line of fire to the right until the tape is pulled

equally taut in both directions. He then places a small stake in the ground at exactly the 15-foot mark on the tape. He then goes to the left and another stake is placed as described for the opposite side, 15 feet from the zero stake. These two small stakes then mark the front line of the emplacement which is perpendicular to the line of fire. To mark the rear line of the emplacement, two small stakes are driven exactly 2 feet to the rear of the two small stakes marking the front line. The distance should be sufficient for a battery of 25 Livens projectors. The position is then marked by stretching tracing tape around the outside of the four small stakes. Upon completion the candidate calls "Ready."

d. Scoring in test.—(1) No credits will be given in the following cases:

- (a) If the time exceeds 3 minutes.
- (b) If the line diverges over 60 mils.
- (c) If the error in length or width is greater than 6 inches.
- (2) If the test is completed in such manner that it will not fall under (1) above, credits will be given as follows:

Error, in mils, of original line exactly or less

than _____ 20 40 60

Credit time less than 2 minutes	10	8	6
Credit time less than 2½ minutes	8	6	4
Credit time less than 3 minutes	6	4	2

■ 20. PREPARATION OF PROPELLANT CHARGES, PROJECTILES, AND WIRING AND TESTING A BATTERY OF THREE PROJECTORS.—Preparation of propellant charges, projectiles, and wiring and testing a battery of three projectors, will be as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. Equipment required.—(1) *For the candidate.*—Three complete rounds of inert L. P. shell, unassembled, one extra charge box, three Livens projectors emplaced, wire, exploder, friction tape, circuit detector, short stakes, hand axe, one pair cutting pliers, wrench, L. P., and range table. The candidate will inspect all lead wires and will be held responsible for broken insulation on lead wires or bad ends for splicing. He may arrange equipment as he desires. The

tape will be removed from the charge boxes and covers loosened sufficiently to be removed by hand. Inert charges will be provided.

(2) *For the board.*—Stop watch and score card.

b. *Conditions.*—The three projectors will be emplaced. The electric circuit of one of the three charge boxes will be made defective by the board. An extra charge box in proper order will be available. The candidate will be allowed to arrange this equipment before time is taken. Transit plugs will be loosened but not taken off. Stakes will be in place. Suitable lengths of friction tape may be placed on top of the stakes by the candidate.

c. *Procedure in test.*—The candidate will be given verbally the range to target, this range to be an even reading from the range table. He will verify the range by repeating it. Time will be taken from the last word of the candidate's verification of the range to the command **READY**, given by the candidate upon the completion of the test. After the candidate repeats the range and his time starts, he will examine the range table and announce the powder charge and will prepare powder charges, assemble projectiles, load projectors, wire and test firing circuit, repair defective circuit or replace same, upon completion of which he will give the command **READY**. When the candidate gives the command **READY** the battery will be ready to fire with safety pins pulled and the exploder connected. The board will carefully observe the procedure of the candidate during this test.

Caution: The board is charged with the responsibility of seeing that inert charges, except squibs, are used in this test.

d. *Scoring in test.*—(1) For each error of 4 ounces in powder charge deduct 2 points.

(2) No credits will be given in the following cases:

(a) If the time exceeds 8 minutes.

(b) If the circuit detector placed on the lead wires at the exploder does not show a complete circuit.

(c) If the projectiles are assembled so that they will not function when fired.

(d) If the pins are not pulled and brought to the exploder position.

(e) If the exploder is not connected correctly.

(3) If the circuit is shown to be complete by circuit detector, credits will be given as follows:

Circuit wired as follows:

	<i>Credits</i>
Western Union splices-----	2
All splices taped-----	2
Lead wires on stakes-----	2
Insulation not damaged by lowering projectile-----	2
Lead wires at top of barrel-----	2
 Total points-----	 10

■ 21. GROUNDING PORTABLE CHEMICAL CYLINDER.—Grounding the portable chemical cylinder will be as prescribed in FM 3-5 (now published as CWS FM vol. I).

a. Equipment required.—(1) *For the candidate.*—One empty cylinder complete, one gas mask, and one wrench.

(2) *For the board.*—Stop watch and score card.

b. Conditions.—Candidate will have the complete cylinder properly slung and gas mask in slung position. Board will instruct candidate to stand facing assumed target which will be pointed out to him.

c. Procedure in test.—The candidate will be given the command GROUND CYLINDER, at which command the cylinder will be properly grounded and stood on hooks pointing to target. The board will commence taking time at command. The candidate will then adjust his gas mask, test cylinder valves by opening and closing (wrench may be used if necessary), unscrew nozzle cap, placing it in rear of cylinder, retire to a prone position 5 paces in rear of cylinder, and call "Time." Time will be taken by a member of the board. The command FIRE will then be given and the candidate required to execute the order in the prescribed manner.

d. Scoring in test.—(1) No credits will be given in the following cases:

- (a) If the cylinder is pointed in the wrong direction.
- (b) If the candidate fails to remove the nozzle cap.
- (c) If the candidate fails to mask properly (gas-tight fit).
- (d) If the time exceeds 2 minutes.
- (e) If the valve was not loosened sufficiently to be opened by hand at the command FIRE.

(2) If the test is completed in such a manner that it will not fall under (1) above, credits will be given as follows:

	Credits
Executed correctly in less than 30 seconds-----	5
Executed correctly in less than 1 minute-----	3
Executed correctly in less than 2 minutes-----	2

SECTION III

EXPERT GUNNER'S TEST

■ 22. SUBJECTS OF EXAMINATION.—Examination for expert gunner consists of the following tests:

	Credits
Preparation of range cards-----	30
Orientation-----	30
Meteorology-----	10
Fire data-----	30
 Total-----	 100

■ 23. PREPARATION OF RANGE CARDS.—*a.* This test includes the preparation of a range card as prescribed in FM 3-5 (now published as CWS FM, vol. I), for a defensive position.

b. The position and sector will be selected by the examining board. The sector will include a reference point and four target positions, each of which will be definitely located by some distinctive feature of the terrain and pointed out on the ground to the candidate. The target positions will be between 600 and 2,000 yards from the selected mortar position and at least 100 mils azimuth from the reference point.

c. The same position and sector will be used for all candidates examined on any one day and, if practicable, all candidates serving at the same post will be examined in this subject on the same day.

d. The candidate is furnished a sketching kit complete and a mil protractor.

e. Ranges are estimated.

f. All range cards will be made of blank paper furnished by the board.

g. No credits will be allowed for any range card not submitted within 30 minutes.

h. Correct ranges and azimuth angles will be determined by the examining board and each target as shown on the candidate's range card will be graded for accuracy as follows: Percentage of error in each range, exactly or

less than _____	15	20	25
Credits _____	3	2	1

Total possible for range estimation, 4 targets and 1 R. P. _____	15
--	----

Error in azimuth angle exactly or less than—

mils _____	20	40
Credits _____	2	1

Total possible for azimuth measurements _____	10
---	----

Neatness:

(1) Work centered on sheet _____	
(2) No unsightly erasures _____	
(3) Neatness in lettering _____	
(4) Neatness in drawing _____	2

Form:

(1) Title _____	
(2) Name of candidate _____	
(3) Grade of candidate _____	
(4) Organization of candidate _____	
(5) Place where card is made _____	
(6) Date card was made _____	3

Total _____	30
Total credits range card _____	30

■ 24. ORIENTATION.—a. *Equipment required.*—(1) *For the candidate.*—Prismatic or lensatic compass, a map of the terrain on which the examination is conducted, protractor, straight-edge, engineer's sketching board complete, short stakes, and hand axe.

(2) *For the board.*—Copy of the map used by the candidate.

b. *Conditions.*—Two separate problems will be given:

(1) Locating candidate's position on the map.

(2) Locating candidate's position on the ground.

c. Procedure in test.—(1) The candidate will be directed to a certain position on the ground, at which point he will be given a map and required to plot his position thereon.

(2) The candidate will be given a map on which a position has been plotted. He will be required to locate this position on the ground with a stake. The map will be furnished to the candidate at a distance of from 300 to 1,000 yards from the correct position on the ground.

d. Scoring in test.—Time limits for each individual problem (1) and (2) will be established by the board.

Scoring problems (1) and (2):

Method	-----	5 credits
Error in yards exactly or less than	50, 75, 100, 125, 150	
Credits for accuracy	10, 8, 6, 4, 2	
No credits for entire test if location is in error in excess of 150 yards.		
Maximum credits for each problem	-----	15
Total credits, two problems	-----	30

■ 25. METEOROLOGY.—Meteorological instruments will be set up and operated as prescribed in FM 3-5 (now published as CWS FM, vol. I).

a. Equipment required.—(1) *For the candidate.*—One wind vane, one anemometer, one compass, one stop watch (unless anemometer with watch), map, pad, pencils, a table converting meters per second to miles per hour, and a circular card, 6 to 8 inches in diameter, constructed as follows: Graduate the card with 16 radii at $22\frac{1}{2}^{\circ}$ angles and reading from 0° to 360° . Draw on the card an arrow perpendicular to and bisecting the 90° radius and pointing north.

(2) *For the board.*—Score card.

b. Conditions.—Candidate will be allowed to arrange his equipment in manner desired. Board will use various maps regardless of terrain on which test is being given to test candidate's knowledge in converting magnetic azimuth readings into true azimuth readings.

c. Procedure in test.—(1) The candidate will be shown the position where he is to set up his instruments.

(2) At the command TIME, given by the board, the candidate will set up the wind vane as prescribed in FM 3-5 (now

published as CWS FM, vol. I), using two sections of the pole, and adjust his circular card on top of the direction markers in such a manner that the arrow points to true north. This is done by placing the compass on the circular card so that the hair line of the cover is directly over the arrow on the card. The card is then rotated until the compass reads the magnetic azimuth that corresponds to true north for the place of examination.

(3) As the candidate reads the wind velocity, a member of the board will check the accuracy of the candidate's work.

(4) As the candidate takes the reading for wind direction, he will call out "Direction," at which time a member of the board will record the wind direction as actually shown by the candidate's instruments.

(5) The candidate records his data on a slip of paper and hands it to the board.

(6) Time is taken from the command TIME, to include the moment when the candidate submits his data to the board.

d. Scoring in test.—(1) No credits for the entire test will be given in the following cases:

(a) If the direction of the wind is in error greater than 45°.

(b) If the velocity of the wind is in error greater than 3 miles per hour.

(c) If the time exceeds 10 minutes.

(2) If the test is completed in such a manner that it will not fall under (1) above, credits will be given as follows:

True wind direction

Error, in degrees, exactly or less than	-----	10	30	45
---	-------	----	----	----

If time for entire test is less than 3 minutes	-----	5	4	3
--	-------	---	---	---

If time for entire test is less than 5 minutes	-----	4	3	2
--	-------	---	---	---

If time for entire test is less than 10 minutes	-----	3	2	1
---	-------	---	---	---

Wind velocity

Error, in miles per hour, exactly or less than	-----	1	2	3
--	-------	---	---	---

If time for entire test is less than 3 minutes	-----	5	4	3
--	-------	---	---	---

If time for entire test is less than 5 minutes	-----	4	3	2
--	-------	---	---	---

If time for entire test is less than 10 minutes	-----	3	2	1
---	-------	---	---	---

Deduct—

2 points for not keeping anemometer facing wind.

2 points for not holding anemometer vertically.

Total credits for meteorology----- 10

e. *Alternative.*—In cases where the necessary equipment is not available to give the test outlined above, the board may give a practical test based upon FM 3-5 (now published as CWS FM, vol. I). Scoring the test will be as prescribed by the board, except that the maximum credit will not exceed 10.

■ 26. FIRE DATA.—Information concerning computation of fire data is found in FM 3-5 (now published as CWS FM, vol. I).

a. *Computation of fire data from map.*—(1) *Equipment required for the candidate.*—Mil protractor, map, pencil, and coordinate square, range table.

(2) *Conditions.*—The candidate will be given coordinate location of mortar and target, range of which falls between 600 and 2,000 yards. He will be required to determine the range and magnetic azimuth of the line mortar-target and announce the firing data as follows: number of rings; magnetic azimuth; elevation. Range tables will not be interpolated.

(3) *Scoring in test.*

Error, in mils elevation, exactly or less than----- 10 15 20

Time under 5 minutes----- 5 4 3

Time under 10 minutes----- 4 3 2

Azimuth error in mils, exactly or less than----- 10 20 30

Time under 5 minutes----- 10 8 6

Time under 10 minutes----- 8 6 4

Deduct 5 points for wrong number of rings.

Total credit for test----- 15

b. *Preparing fire data on the ground.*—(1) *Equipment required for the candidate.*—Protractor, pencil, lensatic compass, sketching table, range finder, field glasses, or mil rule, aiming stake, azimuth circle, and paper.

(2) *Conditions.*—The candidate is conducted to an OP and is there shown a mortar position and a target position. He reads with the lensatic compass and field glasses or azimuth circle the magnetic azimuths "OP-target" and "OP-mortar"; then estimates or measures with any instrument at his disposal the ranges "OP-target" and "OP-mortar." He then plots the position of the OP, mortar, and target, and joins them, with a line "mortar-target"; estimates this range and records same on the paper, then measures the magnetic azimuth of the "mortar-target" line. He records the magnetic azimuth on the paper and submits same to the examining board for check. The problem is checked by the board. Measured ranges are used by the board. Azimuths are taken with the same instruments used by the candidate. The problem is scored as follows:

Range error, percent, equal or less than	15	20	25	30
Time under 10 minutes	5	4	3	2
Time under 12 minutes	4	3	2	1
Time under 14 minutes	3	2	1	0
Azimuth error, in mils, equal or less than	20	30	40	50
Time under 10 minutes	10	9	8	7
Time under 12 minutes	8	7	6	5
Time under 14 minutes	6	5	4	3
No credit for entire problem if range error exceeds 30 percent, if azimuth error exceeds 100 mils, or if time exceeds 14 minutes.	2	1	0	
Total credit for test				15

■ 27. SUGGESTED FORMS FOR SCORE CARD.

GUNNER'S EXAMINATION

Name	(Ser. No.)	(Grade)	(Organization)	(Station)
(Prior qualification)				

CHEMICAL MORTAR:

Emplacing the chemical mortar.....	20
Laying mortar fo elevation and direction (1).....	10
Laying mortar for elevation and direction (2).....	10
Establishing line of direction; position fixed.....	5
Establishing line of direction; position not fixed.....	5
Establishing aiming line by compass azimuth.....	15
Preparation of mortar ammunition.....	10

LIVENS PROJECTOR:

Laying out Livens projector emplacement.....	10
Preparing a battery of Livens projectors for firing.....	10

PORTABLE CHEMICAL CYLINDER:

Grounding and firing the portable chemical cylinder.....	5
--	---

Grand total.....	100
------------------	-----

QUALIFICATION.....	Date.....
--------------------	-----------

CERTIFIED CORRECT.....	(Name).....	(Grade and organization).....
------------------------	-------------	-------------------------------

EXPERT GUNNER'S EXAMINATION

	Possible credits	Grades	Totals
PREPARATION OF RANGE CARD:			
Range.....	15		
Azimuth.....	10		
Form.....	3		
Neatness.....	2		
ORIENTATION:			
Locating position on map.....	15		
Locating position on ground.....	15		
METEOROLOGY:			
True wind direction.....	5		
Wind velocity.....	5		
FIRE DATA:			
Computation of firing data from map.....	15		
Computation of firing data on the ground.....	15		
Grand total.....	100		

FINAL QUALIFICATION..... DATE.....

CERTIFIED CORRECT.....
(Name) _____ (Grade and organization) _____

CHEMICAL WARFARE SERVICE FIELD MANUAL
EXAMINATION FOR GUNNERS

CHANGES
No. 1 }

WAR DEPARTMENT,
WASHINGTON 25, D. C., 18 April 1944.

FM 3-10, 10 June 1940, is changed as follows:

■ 2. CLASSIFICATION OF GUNNERS.—Gunners will be divided into three classes; second class, first class, and expert.

a. The scope of * * * the grade attained. The qualifying mark for classification as second class gunner will be not less than 65 credits; for first class gunner not less than 85 credits.

* * * * *

■ 5. SUBJECTS OF EXAMINATION.—a. (Superseded) *First and second class gunners' examination.*

	Value
(1) 4.2-inch chemical mortar-----	75
(2) Chemical land mines-----	20
Total credits-----	95

* * * * *

■ 6. GENERAL RULES GOVERNING EXAMINING BOARDS.

* * * * *

c. Setting the scales on the sight will be considered correct if any part of the index coincides with any part of the line of graduation of the setting order.

* * * * *

h. Should any candidate fail in any test through the fault of an examiner or an assistant or of a defective sight or other instrument used, or because of defective materials, that test will be void and the candidate immediately given another test of a similar nature.

* * * * *

CHEMICAL WARFARE SERVICE FIELD MANUAL

■ 11. SUBJECT OF EXAMINATION.—Subjects in which the candidate will be examined and the value assigned to each are as follows:

	<i>Credits</i>
4.2-inch chemical mortar	75
Chemical land mines	20
Total credits	95

■ 12. DETAILS OF EXAMINATION.—The examination consists of the following tests:

	<i>Credits</i>
g. (Superseded.) Preparation of a chemical land mine field (nonelectric firing)	10
h. (Superseded.) Preparation of a chemical land mine field (electric firing)	10
Total credits	95

■ 13. EMPLACING CHEMICAL MORTAR.—The chemical mortar will be emplaced as prescribed in TM 3-320.

a. *Surface baseplate.*

*	*	*	*	*
(3) <i>Procedure in test.</i>	*	*	*	*

(c) A member of the board then gives the command TIME, at which command the candidate installs the mortar with the given elevation and deflection as prescribed in TM 3-320. If the candidate * * * respectively, have expired.

*	*	*	*	*
<i>b. Dug-in type baseplate.—Rescinded.</i>	*	*	*	*

■ 14. LAYING MORTAR FOR ELEVATION AND DIRECTION.—Laying the mortar for elevation and direction will be as prescribed in TM 3-320.

*	*	*	*	*
<i>b. Dug-in type baseplate.—Rescinded.</i>	*	*	*	*

■ 15. ESTABLISHING LINE OF DIRECTION WITH ALIDADE OR COMPASS, MORTAR POSITION FIXED.—a. *Equipment.*

*	*	*	*	*
2	*	*	*	*

EXAMINATION FOR GUNNERS

■ 16. ESTABLISHING LINE OF DIRECTION WITH AIMING STAKES, ALIDADE, OR COMPASS, MORTAR POSITION NOT FIXED.—*a. Equipment.*

* * * * *

■ 17. ESTABLISHING AIMING LINE BY COMPASS AZIMUTH.—This exercise is designed to teach the soldier how to establish the aiming line under conditions of indirect firing.

a. Equipment.

* * * * *

■ 18. PREPARATION OF AMMUNITION: ASSEMBLY OF ONE COMPLETE ROUND.—Preparation of ammunition will be as prescribed in TM 3-320.

* * * * *

■ 19. (Superseded.) PREPARATION OF CHEMICAL LAND MINE FIELD (NONELECTRIC FIRING).—This consists of the preparation of three water-filled chemical land mines for simulated firing with safety fuze and M3 burster (detonating cord).

a. Equipment required.—(1) *For the candidate.*—Three 1-gallon water-filled chemical land mines; three M3 bursters; one inert fuze lighter; one inert or simulated nonelectric detonator with 1½ feet of safety fuze attached; one roll of ¾-inch friction tape; one knife; 40 yards of detonating cord (primacord); and one 2-foot length of detonating cord.

(2) *For the board.*—Stop watch and score card.

b. Conditions.—(1) Components of the mine assembly will be detached from one another. These components are: M3 bursters, land mines, 40 yards of detonating cord, one 2-foot length of detonating cord, one inert fuze lighter, one inert or simulated nonelectric detonator with 1½ feet of safety fuze attached, and friction tape.

(2) The candidate will arrange the detached equipment as he desires within a 10-foot square.

c. Procedure in test.—When the candidate is ready "Time" will be called by the board. At the command TIME, the candidate will proceed as follows:

(1) Lay a 40-yard length of detonating cord in a straight line.

(2) Assemble mines by attaching bursters.

(3) Lay assembled mines on the detonating cord 15 to 20 yards apart.

CHEMICAL WARFARE SERVICE FIELD MANUAL

(4) Use two half hitches to make branch connection between 2-foot length detonating cord and 40-yard length, about 1 foot from either end.

(5) Tape inert or simulated detonator-safety fuze assembly to one end of 40-yard length of detonating cord. Use the split-cord method.

(6) Attach inert fuze lighter to inert or simulated detonator-safety fuze assembly.

(7) Call "Ready" when installation is complete. (The board will record the time.)

NOTE.—The board then examines the installation and records the score.

d. Scoring in test.—(1) No credit will be given in the following cases:

(a) If more than 7 minutes are required to complete the installation.

(b) If all three bursters are improperly assembled to mines.

(c) If the completed installation would fail to fire due to faulty installation.

(2) The following credits for installation will be given:

Time for complete installation:

	5 minutes or less	5 to 6 minutes	6 to 7 minutes
Credit: For three bursters properly assembled to mines	2	1	.50
For two bursters properly assembled to mines	1	.50	0
Possible credit			2
For laying out detonating cord and properly spacing mines on it	2	1	.50
Possible credit			2
For branch connection	2	1	.50
Possible credit			2
For assembling detonator to detonating cord	2	1	.50
Possible credit			2
For attaching fuze-lighter to safety fuze	2	1	.50
Possible credit			2
Total possible credit for complete test			10

EXAMINATION FOR GUNNERS

■ 20. (Superseded.) PREPARATION OF CHEMICAL LAND MINE FIELD (ELECTRIC FIRING).—This consists of the preparation of three water-filled chemical land mines for simulated firing with M4 bursters by a blasting machine.

a. Equipment required.—(1) *For the candidate.*—Three 1-gallon water-filled chemical land mines; three M4 bursters; three inert or simulated No. 8 detonators (electric), with 30-foot leads; a 100-yard length of duplex wire; a knife; a circuit detector; a blasting machine; and friction tape.

(2) *For the board.*—Stop watch and score card.

b. Conditions.—(1) *For the candidate.*—The candidate will be allowed—

(a) To inspect for serviceability all equipment used in the test. A 3-minute time limit will be set for this inspection. (The test will not be voided after it has begun because of faulty equipment which the candidate should have discovered upon inspection.)

(b) To arrange all equipment except the blasting machine within a 10-foot square as near the mine emplacement as desired; the blasting machine will be placed about 80 yards to the rear of the emplacement.

(2) *For the board.*—The board will see that—

(a) All equipment is disassembled and in serviceable condition.

(b) Inert or simulated detonators are removed from bursters.

(c) Splices are separated (detonator lead wires will not be connected).

(d) Bursters are not fastened to land mines.

(e) Detonator lead wires are connected to inert detonators in a manner to insure a complete circuit.

c. Procedure in test.—When the candidate is ready, "Time" will be called by the board. At the command TIME, the candidate will proceed as follows:

(1) Test inert or simulated detonators and duplex lead wire.

(2) Attach bursters to mines.

(3) Insert inert or simulated detonators in bursters and replace stoppers.

(4) Secure inert or simulated detonator leads to mines by wrapping them twice about the mine handles.

CHEMICAL WARFARE SERVICE FIELD MANUAL

- (5) Lay mines 15 to 20 yards apart in a line.
- (6) Splice inert or simulated detonator leads together to wire the circuit in series.
- (7) Splice the duplex lead wire to the inert or simulated detonator lead wires of the end mines and tape, then string the duplex wire from the emplacement to the blasting machine. (Do not connect. Use combination splice.)
- (8) Test completed circuit, then announce "Ready." (The board will record the time.)
- d. *Scoring in test.*—(1) No credit will be given in the following cases:
 - (a) If more than 9 minutes are required to complete the installation.
 - (b) If two detonators are improperly inserted in bursters.
 - (c) If final test of completed installation shows unsatisfactory circuit.
- (2) The following credits for installation will be given:

Time for complete installation

	<i>7 min- utes or less</i>	<i>7 to 8 min- utes</i>	<i>8 to 9 min- utes</i>
Credit: For making test of detonator and duplex lead wires	1	.50	.25
Possible credit			1
Bursters attached correctly to three mines	1	.50	.25
Bursters attached correctly to two mines	.50	.25	0
Possible credit			1
Detonators correctly inserted in three bursters	2	1	.50
Detonators correctly inserted in two bursters	1	.50	.25
Possible credit			2
Detonator lead wires wrapped around handles of three mines	1	.50	.25
Possible credit			1

EXAMINATION FOR GUNNERS

	7 min- utes or less	7 to 8 min- utes	8 to 9 min- utes	
Correct splices and taping for each of four wire connections	1	.50	.25	
Possible credit				4
Test shows satisfactory circuit	1	.50	.25	
Possible credit				1
Total possible credit for complete test				10

■ 21. GROUNDING PORTABLE CHEMICAL CYLINDERS.—Rescinded.

■ 23. PREPARATION OF RANGE CARDS.—This test includes the preparation of a range card (reference, paragraph 79, FM 23-90).

* * * * *

■ 25. METEOROLOGY.—Meteorological instruments will be set up and operated as prescribed in TM 3-240.

* * * * *

c. Procedure in test.

(2) At the command TIME, given by the board, the candidate will set up the wind vane as prescribed in TM 3-240.

* * * * *

c. Alternative.—In cases where the necessary equipment is not available to give the test outlined above, the board may give a practical test based upon TM 3-240. Scoring the test will be as prescribed by the board, except that the maximum credit will not exceed 10.

■ 26. FIRE DATA.—Information concerning computation of fire data is found in TM 3-320.

* * * * *

■ 27. SUGGESTED FORMS FOR SCORE CARD.

CHEMICAL WARFARE SERVICE FIELD MANUAL

GUNNER'S EXAMINATION

Name (Ser. No.) (Grade) (Organization) (Station)

(Prior qualification)

	Possible credits	Grades	Totals
CHEMICAL MORTAR:			
Emplacing the chemical mortar.....	20		
Laying mortar for elevation and direction (1).....	10		
Laying mortar for elevation and direction (2).....	10		
Establishing line of direction; position fixed.....	5		
Establishing line of direction; position not fixed.....	5		
Establishing aiming line by compass azimuth.....	15		
Preparation of mortar ammunition.....	10		
CHEMICAL LAND MINES:			
Preparation of a chemical land mine field (non-electric firing).....	10		
Preparation of a chemical land mine field (electric firing).....	10		
Grand total.....	95		

QUALIFICATION Date

CERTIFIED CORRECT (Name) (Grade and organization)

* * * * *

[A. G. 300.7 (11 Mar 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,

Chief of Staff.

OFFICIAL:

J. A. ULIQ,

Major General,

The Adjutant General.

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For explanation of symbols, see FM 21-6.



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